multi-pixel sensor array in which all pixels and the driven shield are at the same voltage and at all times in phase.

By maintaining all pixels (grids 112, 114) and the driven shield 118 at the same voltage and in phase, cross-talk between the pixels is eliminated with the driven shield 118 reflecting electric energy fields away from electrical ground and towards any approaching probe 102. Thus range, resolution and signal-to-noise ratio are all at peak performance levels. However, as a conductive/dielectric probe 102 approaches the TC camera 110, the impedance changes at individual pixels. A response is felt in a connected Current-Measuring Voltage Follower which both supplies any needed additional current and measures any phase shift and the amount of current supplied. These current changes varying for each pixel depending upon that particular pixel's physical relationship to the probe 102 and so, considering all pixels together, a capacitive (3-D) image of the probe may be derived.

At any distance above the preferred TC camera 110 greater than the spacing of the grid wires 134, especially since the probe is the centroid of an object instead of a point, each grid row/column 132 may be treated, effectively, as a solid metal strip rather than individual lines. Further, using software to interpolate, the combined lines of each grid/column may be treated as a solid strip at even closer ranges. Thus, probe 102 distance and location determination may be treated essentially, identically for all embodiments (including the below described alternate embodiments) with potentially only minor adjustments being necessary, but with accurate results, at least to the first order. Thus, the below description of locating objects within the TC camera 110 viewing field is provided without reference to any particular embodiment and is intended to be applicable equally to all embodiments, any special requirements for a particular embodiment being noted specifically.

Accordingly, the probe's X-Y position and correspondingly movement, may be derived from parameter changes in response to probe placement. It is well known that:

$$C = \frac{\varepsilon A}{d},$$